PATENT ABSTRACTS OF JAPAN

(11)Publication number : **11-092779**

(43)Date of publication of application : **06.04.1999**

(51)Int.Cl. C10M171/00
C10M137/10
C10M159/22
// C10N 10:04
C10N 20:00
C10N 30:04
C10N 30:06
C10N 40:04

(21)Application number : **09-275266**

(22)Date of filing : **22.09.1997**

(71)Applicant : **SHOWA SHELL SEKIYU KK**
NISSAN MOTOR CO LTD

(72)Inventor : **MITSUI HIDEAKI**
WATANABE TSUGIO
NUMAZAWA KOICHI
ISHIKAWA TAKAO
YANAIHARA RIKA
YAMASHITA HIROSHI

(54) LUBRICATING OIL COMPOSITION

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a lubricating oil composition for belt-type infinitely variable gear which allows the transmission of large power between belt and pulley and to wet clutch plate and can maintain the aforesaid performance even after a long term travel (e.g. 50,000-60,000 km travel).

SOLUTION: (1) A friction coefficient of 0.125-0.150 at a sliding speed of 0.26 m/s with a normal load of 250 Lbs or 250 Lbs according to the LFW-1 testing method specified in ASTM D2714, (2) a friction coefficient of 0.125-0.150 as measured using the testing method of (1) after deterioration for 96 hours at an oil temperature of 150°C according to the testing method for oxidation stability specified in JIS K2514, and (3) a friction coefficient of 0.135-0.150 at an oil temperature of 80°C, a bearing pressure of 1.0 MPa and a sliding speed of 0.65 m/s using the low-velocity sliding friction testing apparatus(LVFA) specified in JASO M349-95.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

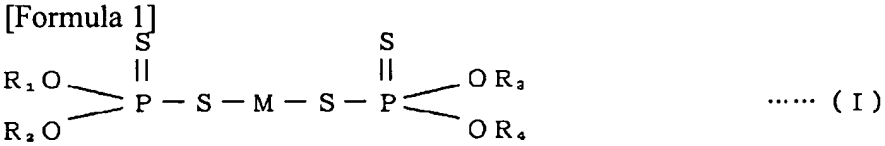
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the actuation lubricating oil constituent or gear oil constituent which makes it possible to perform smoothly the lubrication of a lubricating oil constituent, especially the belt type stepless change gear of an automobile, and actuation.
[0002]
[Description of the Prior Art] Although what consists of the gear change section and the oil pressure control section which combined the torque converter with a lock-up clutch, the wet clutch, and the epicyclic gear as the automatic transmission and fluid coupling for current automobiles is adopted widely, from 3, fuel consumption effectiveness is bad and there is a fault of the displeasure according [a change gear ratio] to a gear change shock in six steps again. The pulley from which the spacing width of face of a fast pulley and a movable pulley can be continuously changed to a driving shaft and a follower shaft as that with which this fault is compensated was attached, and the nonstep variable speed gear which transmits power and carries out stepless gear change of between these two pulleys through a metal belt has been put in practical use.
[0003] In order to transmit power as engine performance required as a lubricating oil constituent used here using the frictional force between one belt and a pulley, high coefficient of friction is required between a belt and a pulley.
2) In order to maintain long-term endurance as an object for automobiles to coincidence, it is required for there to be little wear of a belt and a pulley.
3) In order to transmit high torque also to the wet clutch currently used for the pre-go-astern switch clutch of the gear change section, and the lock-up clutch section, high coefficient of friction is required between wet clutches.
4) In order to control the spacing width of face of a driving shaft, the fast pulley attached in the follower shaft pulley, and a movable pulley through oil pressure, having the engine performance as a working fluid etc. is mentioned.
[0004] ATF (Automatic Transmission Fluid) has been widely used till the former as what fills the above-mentioned engine performance. Although this was comparatively used for the small-size car of low-power output, when a belt type nonstep variable speed gear comes to be used for a high power engine-loading vehicle, a big torque-transmission capacity is needed. Since many friction regulators are added in order to improve the friction property of a wet clutch, if used for belt type stepless change gears, coefficient of friction will fall, and the conventional ATF has possibility that will produce slipping between a belt and a pulley and transfer of power will become impossible.
[0005]
[Problem(s) to be Solved by the Invention] This invention enables mass power transfer between a belt and a pulley and at a wet clutch plate, and after prolonged transit (for example, 50,000-60,000km transit) is to offer the lubricating oil constituent for belt type without-notice change gears which can hold the above-mentioned engine performance.

[0006]
[Means for Solving the Problem] The description of this invention is (1) ASTM. LFW-1 test method specified to D2714 is used. Coefficient of friction at the time of sliding-velocity 0.26 m/s is 0.125-0.150 (2) JIS as normal load 250Lbs or 300Lbs(es). The oxidation stability test method specified to K2514 is used. Coefficient of friction which used and measured the test method of the above (1) after making it deteriorate at 150 degrees C of oil temperatures for 96 hours is 0.125-0.150, and (3) JASO. The low-speed sliding-friction testing device (LVFA) specified to M349-95 is used. 80 degrees C of oil temperatures, planar pressure 1.0MPa, And it is in offering the lubricating oil constituent for belt type without-notice change gears characterized by coefficient of friction at the time of sliding-velocity 0.65 m/s being 0.135-0.150.
[0007] That is, said lubricating oil constituent of this invention is a lubricating oil constituent which can give coefficient of friction which realizes coefficient of friction suitable between a metal pulley and a belt in a belt type nonstep variable speed gear, enables sufficient power transfer, has the endurance ability which maintains the coefficient of friction further, and can hold sufficient torque-transmission capacity also for the wet-clutch section to coincidence.
[0008] Sufficient effectiveness cannot be done so in respect of effectiveness, such as a friction property that the lubricating oil constituent which is not satisfied at least one sets the requirements said that coefficient of friction of (1) and (2) is [coefficient of friction of 0.125-0.150, and (3)] 0.135-0.150 for said lubricating oil constituent of this invention as the purpose of this invention, and a wear property, especially power transfer characteristics, etc.
[0009] Next, each component which constitutes said lubricating oil constituent of this invention is explained. To mineral oil, synthetic oil, or both mixed (oil A) 100 weight section, at least, in both 0.1 - 2.0 weight sections (B), the lubricating oil constituent of this invention contains metal salt system detergent, and the 0.1 - 2.0 weight section and dialkyl dithio zinc phosphate are constituted [detergent].

[0010] It is necessary to contain both metal salt system detergent agent and dialkyl dithio zinc phosphate as the aforementioned (B) component of the lubricating oil of this invention. As the aforementioned (B) component, what does not contain said both one side, either cannot do sufficient effectiveness so in respect of effectiveness, such as a friction property made into the purpose of this invention, and a wear property, especially power convective, etc.
[0011] As said metal system detergent, there is a metal salt of alkaline earth metal, such as calcium and Mg, there are sulfonate, phenate, a SARISHI rate, phosphonate, etc. as a compound, and what blended more than these kinds is used. Since the operation to which especially phenate raises coefficient of friction is highly desirable, what contains phenate at least is desirable. Moreover, the ultrabasic detergent which made said metal salt contain the hydroxide or carbonate of said metal superfluously can also be used.
[0012] the addition of said metal system detergent -- the 0.1 - 2.0 weight section -- it is the 0.1 - 1.0 weight section preferably. If the increment effectiveness of coefficient of friction has few additions of said metal system detergent under at the 0.1 weight section and the 2.0 weight sections are exceeded, it will have a bad influence on a wear property etc.
[0013] As dialkyl dithio phosphate, what is expressed with a bottom type (I) is mentioned.
[Formula 1]



…… (I)

The carbon number of R1, R2, R3, and R4 is the alkyl group of 3-10 among a front type. Although the dialkyl dithio phosphate expressed with a front type (I) has a difference in the effectiveness by changing the (hydrocarbon-group R) metallurgy group component (M) of a front type (I), as a metal of said M, zinc is desirable.
[0014] Said dialkyl dithio zinc phosphate is contributed to improvement in abrasion resistance and

antioxidizing nature while it raises transfer torque capacity by raising coefficient of friction between metals. Although it is the 0.1 to 2.0 weight section as loadings of said dialkyl dithio zinc phosphate, when there is too little this blending ratio of coal, even if many [it cannot expect the improvement in coefficient of friction, abrasion resistance, etc. and / too], coefficient of friction may be reduced.
[0015] The mineral oil which received solvent refining or a hydrogen treating as lubricating oil base oil used by this invention, synthetic oil, these mixed oils, etc. can be used. For example, the Pori alpha olefins, polybutenes, diester, polyethylene propylenes, the poly alkyl glycols, and hindered ester are mentioned as synthetic oil, and respectively independent or two kinds or more can be mixed and used. These lubricating oil base oil viscosity (100 degrees C) is usually 2-10mm2/s.
[0016] In addition to said metal salt system detergent and dialkyl dithio phosphorus zinc phosphate, the lubricating oil constituent of this invention can also add and use the additive of common use for the lubricating oil constituent of others (such mixture is called ATF package), such as a washing dispersant, an antioxidant, an antifriction agent, corrosion inhibitor, a viscosity index improver, a pour point depressant, and a defoaming agent, if needed within limits which do not spoil the purpose.
[0017] Next, it is attached to the test method which specifies said property of the lubricating oil constituent of this invention, and explains.
1. LFW-1 trial ASTM Based on LFW-1 test method specified to D2714, coefficient of friction was computed from the frictional force 60 minutes after test time on the following experiment conditions. Evaluation equipment: Falex Block-on-Ring Friction and Wear Testing Machine Test piece : Ring-Falex type S-10 Block-Falex type H-60 Sliding velocity : 0.26m/s Load : 250Lbs or 300Lbs(es) Oil temperature : 110 degrees C Test time: 60 minutes [0018] 2. Wet friction performance test JASO Based on M349-95, coefficient of friction was computed from the frictional force 120 minutes after test time on the following experiment conditions using the low-speed sliding-friction testing device (LVFA) [the Shinko Engineering Co., Ltd. make].
Experiment condition evaluation equipment : Low-speed sliding-friction testing device (LVFA) Clutch friction material: Paper system ingredient sliding velocity for domestic automatic transmissions : 0.65 m/s embossing pressure : 1.0MPa oil temperature : 80-degree-C test time : 120 minutes [0019] The dialkyl dithio zinc phosphate shown in the following table 1 to what blended the viscosity index improver with the mixed oil of examples 1-7 and the example 1 of a comparison - 6 purification paraffin series, and naphthene mineral oil (100-degree C kinematic viscosity 7mm2/s), calcium phenate, or an ATF package additive was added, and the lubricating oil constituent was adjusted (whole-quantity 100 weight section). It is JIS about said lubricating oil constituent. The aforementioned trial was performed using the oxidation stability test method specified to K2514 about the degradation oil degraded as 150 degrees C of oil temperatures for 96 hours.
[0020]
[Table 1]

実施例			1	2	3	4
油中のＺｎ－ＤＴＰ 重量％			0.2	0.5	1.0	0.5
油中のＣａフェネート 重量％			0.5	0.5	0.5	0.2
ＡＴＦパッケージ			－	－	－	－
LFW-1 試験	新油	摩擦係数	0.130	0.134	0.132	0.135
	劣化油	摩擦係数	0.137	0.131	0.134	0.136
LVFA 試験	２時間後の摩擦係数		－	0.150	－	－

[0021]
[Table 2]

実施例			5	6	7
油中のＺｎ－ＤＴＰ 重量％			0.5	1.0	0.5
油中のＣａフェネート 重量％			1.0	1.0	0.5
ＡＴＦパッケージ添加剤 重量％			－	－	10
LFW-1 試験	新油	摩擦係数	0.127	0.135	0.138
	劣化油	摩擦係数	0.140	0.126	0.134
LVFA 試験	２時間後の摩擦係数		－	－	0.140

[0022]

[Table 3]

比較例			1	2	3	4	5	6
油中のＺｎ－ＤＴＰ 重量％			0.5	－	－	－	－	－
油中のＣａフェネート 重量％			－	0.5	－	－	－	－
市販のＡＴＦ－１ 重量％			－	－	－	100.0	－	－
市販のＡＴＦ－２ 重量％			－	－	－	－	100.0	－
市販のＡＴＦ－３ 重量％			－	－	－	－	－	100.0
LFW-1 試験	新油	摩擦係数	0.132	0.122	0.137	0.086	0.115	0.102
	劣化油	摩擦係数	0.100	0.094	0.123	－	－	－
LVFA 試験	２時間後の摩擦係数		0.135	0.165	0.115	－	－	－

[0023]
[Effect] According to the lubricating oil constituent of this invention, mass power transfer was possible between a belt and a pulley and to a wet clutch plate, and there was little effect on the above-mentioned engine performance by degradation, and the lubricating oil constituent which can be held, especially the gear oil constituent for nonstep variable speed gears were substantially provided with the original engine performance.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] (1) ASTM LFW-1 test method specified to D2714 is used. Coefficient of friction of sliding-velocity 0.26 m/s is 0.125-0.150(2) JIS as normal load 250Lbs or 300Lbs(es). The oxidation stability test method specified to K2514 is used. Coefficient of friction which used and measured the test method of the above (1) after making it deteriorate as 150 degrees C of oil temperatures for 96 hours is 0.125-0.150, and (3) JASO. The low-speed sliding-friction testing device (LVFA) specified to M349-95 is used. 80 degrees C of oil temperatures, planar pressure 1.0MPa, And the lubricating oil constituent for belt type without-notice change gears characterized by coefficient of friction at the time of sliding-velocity 0.65 m/s being 0.135-0.150.
[Claim 2] The lubricating oil constituent for belt type without-notice change gears according to claim 1 which contains [metal salt system detergent] both 0.1 - 2.0 weight sections (B) for the 0.1 - 2.0 weight section and dialkyl dithio zinc phosphate at least to mineral oil, synthetic oil, or both mixed (oil A) 100 weight section.
[Claim 3] The lubricating oil constituent for belt type without-notice change gears according to claim 2 whose metal salt system detergent is alkaline earth metal phenate.
[Claim 4] The lubricating oil constituent for belt type without-notice change gears according to claim 3 whose alkaline earth metal phenate is calcium phenate.
[Claim 5] The gear oil constituent for belt type nonstep variable speed gears which consists of a lubricating oil constituent according to claim 1, 2, 3, or 4.

[Translation done.]